METHODS AND APPARATUS FOR AN INSERTION GUIDE DEVICE

CROSS-REFERENCE

The present application is a non-provisional of, and claims the benefit of U.S. Provisional Patent Application No. 61/842,879 filed on Jul. 3, 2013; the entire contents of which are incorporated herein by reference.

The present application is related to U.S. patent application Ser. No. 14/322,702 filed Jul. 2, 2014; the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to medical devices and methods, and more particularly relates to delivery instruments and methods for deploying an interbody fusion implant into an intervertebral disc space.

Various interbody fusion implants (also referred to as interbody fusion devices) may be implanted in the intervertebral disc space. These devices facilitate fusion of the adjacent vertebrae together. Depending on the size of the interbody fusion device and the corresponding delivery instrument, a surgeon may have to remove bone from the surrounding vertebrae in order to provide adequate space. Clearly, it would be desirable if bone removal could be minimized or eliminated all together. Moreover, adjacent tissue may also need to be retracted or removed, and it would be desirable to minimize or eliminate this as well. Also, insertion of the implant often requires distraction of the vertebrae, therefore it would be desirable to provide a low profile implant that minimizes the amount of distraction required.

Newer interbody fusion devices are being developed which have a smaller more compact profile for delivery and a larger expanded profile after deployment. The smaller delivery size facilitates delivery, and the larger deployed configuration facilitates support and fusion of the bone. Therefore, it would be desirable to provide improved delivery instruments which can accurately and safely deliver and deploy interbody fusion devices including those that have collapsed configurations for delivery and expanded configurations after deployment. At least some of these objectives will be satisfied by the devices and methods disclosed below.

2. Description of the Background Art

The following U.S. Pat. Nos. and US patent publications are related to interbody fusion devices and their delivery: U.S. Pat. Nos. 6,652,533; 3,486,505; 2011/0071634; U.S. Pat. Nos. 7,896,884; 7,625,379; 6,755,841; 5,431,658; and RE43317.

SUMMARY OF THE INVENTION

The present invention generally relates to medical devices and methods, and more particularly relates to delivery instruments and methods for deploying an interbody fusion implant into an intervertebral disc space.

In a first aspect of the present invention, a delivery instrument for facilitating the placement of an interbody implant into an intervertebral space of a patient comprises a plurality of elongated plates disposed adjacent one another. Each elongated plate has a proximal portion and a distal portion. The distal portion of each elongated plate is sized and shaped to fit into the intervertebral space, and also the distal portion of each elongated plate is configured to engage a vertebral body in the intervertebral space. An expandable member is coupled

to the plurality of elongated plates so as to form an enclosed tube for at least a portion of the length of the plurality of elongated plates. The enclosed tube is sized and shaped to receive the interbody implant. The expandable member allows for translation of the plurality of elongated plates relative to one another as the interbody implant passes through the tube.

The expandable member may be an elastomeric tube that is disposed over the plurality of elongated plates. The expandable member may comprise two or more flexible sheets of resilient material that extend from one elongated plate to another elongated plate. The plurality of elongated plates may have a geometry that is configured to engage the interbody implant passing through the tube, and the plurality of elongated plates may have a geometry that guides the interbody implant into the intervertebral space. The geometry that engages the interbody implant may comprise a plurality of rails extending from the plurality of elongated plates.

The plurality of elongated plates may be expandable to allow the delivery instrument to expand in one or multiple directions in order to accommodate various sizes of interbody implants. The plurality of elongated plates may have a longitudinally oriented slit located therealong, and the slit may be configured to allow the plurality of plates to expand and contract. The longitudinally oriented slit may comprise a stress relief feature. The plurality of plates may be coupled together adjacent their proximal portion.

At least one of the plurality of elongated plates may comprise a finger loop adjacent a proximal end thereof, and the finger loop may be configured to facilitate grasping by an operator's finger. The delivery instrument may further comprise a stop element disposed adjacent a distal portion of at least one of the plurality of elongated plates. The stop element may be configured to limit insertion of the delivery instrument into the intervertebral space.

In another aspect of the present invention, a system for delivering an implant to an intervertebral space of a patient comprises the delivery instrument previously described above as well as an interbody implant.

In still another aspect of the present invention, a method for delivering an interbody implant into an intervertebral space between adjacent vertebral bodies of a patient comprises providing a delivery instrument having a plurality of elongated plates disposed adjacent one another and coupled together with an expandable member, and advancing the interbody implant along a tube formed by the plurality of elongated plates and the expandable member. The method also comprises translating the plurality of elongated plates relative to one another as the interbody implant advances along the tube, ejecting the interbody implant from the delivery device, and returning the elongated plates to an unbiased configuration after the interbody implant has been ejected.

Translating the plurality of elongated plates may comprise moving the plurality of plates away from one another, or expanding or collapsing the expandable member. The expandable member may comprise an elastomeric tube that is disposed over the plurality of elongated plates.

Advancing the interbody implant may comprise guiding the interbody implant along the tube with a plurality rails extending from the plurality of elongated plates. A stress relief feature may be included in one or more of the plurality of elongated plates, and the method may further comprise relieving stress in the delivery instrument as the interbody implant is translated therealong.

Translating the plurality of elongated plates may comprise expanding or contracting a slit disposed in at least one of the plurality of elongated plates. The plurality of elongated plates